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Effective Factors on Occupational Noise Protection Among Industrial Workers

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Abstract: Hearing protection is very important for workers in noisy work environments, although the willingness of workers to wear hearing protectors depends heavily on some factors. This study evaluated effective factors on use of hearing protection devices. A cross sectional study carried out on 396 randomly selected from among industrial workers at the Qom province, Iran. In workplaces the noise levels were above the safe limit of 85 dB. Data collected through a questionnaire and analyzed by SPSS software. 331/396 (83.6%) of the workers used of hearing protection devices. 266/396 (67.2%) had high facilitation in their workplaces, 69/396 (17.4%) had employers' with education background higher than 12th grade, 296/396 (74.7%) passed health education period before employment. There were significant difference between above three factors and use of hearing protection devices.

Key words: Hearing protection device, worker, occupational noise, effective factors, industrial

INTRODUCTION

Occupational exposures to noise unavoidable in the industries, but these exposures could be minimized through efficient control measures at the worksite and/or the proper use of appropriate personal protective equipment (Gomes *et al*., 2002). Hearing Protection Devices (HPD), such as ear muffs and ear plugs are widely used in the workplace to provide hearing protection for workers exposed to high levels of noise (Peters, 2003). It is important that HPD should be available in high-noise workplaces, but it is also essential that workers be aware of the need to use HPD (Arezes and Miguel, 2005). The present study aimed at analyzing probably effective factors on the HPD use in the workers. Another purpose of the experiment was explained to the relationship between these factors and HPD use at the Qom province, Iran.

MATERIALS AND METHODS

This cross-sectional study was carried out among industrial men workers at the Qom province factories in Iran. This study included a randomly sample selection of 396 workers and was done in all industrial companies where had more than 5 workers with noise levels above the safe limit of 85 dB. Workplaces noise exposure levels were assessed using an integrating sound level meter and noise dosimeters (Bruel and Kjaer types 2260 and 4436, respectively). A structured questionnaire was administered to obtain information related to factors towards the use of HPD. Using these questionnaires data were collected through oral interview. Our study undertaken to assess probably effective factors on HPD use and the relationship between these factors and HPD use at the Qom province, Iran.

RESULTS

The detail of important factors that may influence the wearing HPD in industrial workers showed in (Table 1). The obtained results showed that 331/396(83.6%) of the workers wore some form of hearing protection and 357/396 (90.15%) of them had occupational hygienist in their workplaces. The survey also showed that 296/396 (74.7%) of the workers passed health education period before employment. 266/396 (67.2%) of the workers work in workplaces with high facilitation. The levels of employers' education background in 69/396 (17.42%) of factories was higher 12th grade. Statistically no significant differences were found regarding the use of HPD within several analyzed categories which listed in (Table 1). Namely, there were statistical significant differences between employers' education background ($p = 0.002$) by Fishers' exact test, factories facilitation ($p = 0.000$) by Fishers' exact test and health education before employment ($p = 0.001$) by Chi square test with HPD use.

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Table 1: Workers' HPD use profile

Variable	No. of workers (N)	Percentage of HPD use (%)
Age (years)		
<30	200	83
>30	196	84.2
Seniority (years)		
<10	285	84.6
>10	111	81.1
Education background		
<4th grade	14	86.7
4th-9th grade	235	83.12
9th-12th grade	137	84.6
>12th grade	5	66.7
Health education before employment		
With education	296	92.2
Without education	100	58
Factories facilitation		
Low	130	66.9
High	266	92.1
Type of HPD		
Ear muff	68	81.7
Ear plug	323	84
Presence of occupational hygienist		
Yes	357	82.9
No	39	89.7
Employers' education background		
Less than 12th grade	327	80.7
Higher 12th grade	68	97.1

DISCUSSION

Noise may be defined as a complex mixture of simple sound waves and, for purposes of this study, represents factory noise above 85 dB in intensity (Barron and Poole, 1952). Over 30 million workers are exposed to hazardous noise on the worksite. Hearing conservation programs are required by law for workers in industrial settings where noise exposures equal or exceed 85 dB. Reducing noise through engineering or administrative controls in the first line of defense. When this is not sufficient, two types of personal hearing protection devices are available: passive hearing protection devices such as ear muffs, canal caps and ear plugs, which reduce noise mechanically and active noise reduction devices, which electronically cancel sound waves at the ear (Lusk, 1997). Although hearing protectors have been available for more than 60 years, little field surveillance has been done to assess their appropriate wear in noisy occupational environments (Daviss and Sieber, 1983). This study examined historical field survey data to determine whether workers use hearing protection when exposed to loud noise. In our approach 83.6% of the workers use of HPD in their workplaces. A study in Malaysia found that hearing protection was provided to 80% of noise-exposed factory workers, but only 5% wore them regularly (Ologe *et al*., 2005). Workers in Hong Kong rarely wore earplugs or ear covers while working under high noise 11.8%. Their protection against occupational noise was very low in frequency (Cheung, 2004). Another study reported ear muffs or plugs were never used by any of workers at the iron foundry, though required (Gomes *et al*., 2002). In a research done in Portugal 28% of the workers use of HPD (Arezes and Miguel, 2006). Our study found that 82.9% of the workers who use of HPD had occupational hygienist in their workplaces. Using Fisher's exact test we can not found relationship between presence and absence of occupational hygienist and HPD use ($p = 0.365$).

Previous studies reported that the occupational health hygienist has a major role in promoting increased use of HPD (Lusk, 1997). Under certain conditions earplugs provide the most effective protectors although the attenuation is higher for earmuffs than for earplugs (Erlandsson *et al*., 1980). This study looked at the impact of kind of HPD on HPD use frequency. There was no significant difference between these two variables by Fisher's exact test ($p = 0.718$). From the analysis of the questionnaire data it is possible to verify that, HPD use in more consistent in factories with high facilitation. Using Fisher's exact test there was a significant difference between factories facilitations and HPD use statistically ($p = 0.000$). Some studies suggest that companies must play an important role in increasing the regular use of HPD by changing their facilities (Arezes and Miguel, 2006). The obtained results indicate that 97.1% of the workers that were under employer with higher than 12th grade wear HPD. While this rate in workplaces with employer education background less than 12th grade was 80.73%, By Fisher's exact test there was a statistical significant difference between employers' education background and HPD use ($p = 0.002$). The percentage of workers in each demographic category (age, seniority, education background) who reported HPD use presented in (Table 1). We can see that HPD use is lower in workers with higher experience and the younger workers. These findings consistent to reports of previous studies (Arezes and Miguel, 2006). There was not significant difference between these three variables with HPD use. Others indicated that only in younger workers, with minor professional experience and with high educational background, HPD are effectively used to protect their hearing (Arezes and Miguel, 2005). Our findings showed that HPD use is more consistent in workers who had health education before employment. Using Chi square test relationship between health education before employment and HPD use was significant ($p = 0.001$).

CONCLUSION

Briefly, the important design factors that influence the wearing of HPD in industrial workers included: factories facilitation, employers' education background, health education before employment.

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